HAWAII DEEP WATER CABLE PROGRAM

PHASE II-D

TASK 5

BIBLIOGRAPHY

d Economic Development

HAWAII DEEP WATER CABLE PROGRAM

PHASE II-D

TASK 5

BIBLIOGRAPHY

Prepared by

G. Krasnick and J. Mansur

of Parsons Hawaii

for

Hawaiian Electric Company, Inc.

and the

State of Hawaii

Department of Business and Economic Development

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SECTION 1

INTRODUCTION

This bibliography summarizes all of the reports which have been produced on the Hawaii Deep Water Cable Program, including those funded by the Hawaii Department of Business and Economic Development and the U.S. Department of Energy. The data included herein were compiled using dBASE III PLUS[1].

The reports are listed under ten categories:

000	General Management and Administration
100	Cable Subsystem
200	Cable Handling Equipment Subsystem
300	Cable Vessel Subsystem
400	Electrical Grid System
500	Systems Integration and Testing
600	Economics
700	Route Identification
800	Environmental - Observations, Testing and Analyses
900	Public Information

Within each category, reports are assigned HDWCP call numbers chronologically beginning at the appropriate hundred level. Each report is a separate record composed of data in eight fields:

- o date - year in which the report was produced
- o title - title of the report as it appears on the cover
- o corporate author - the name of the company directly responsible for producing the report
- o personal author - where individual authors are identified on the title page or were made known in correspondence their names are included here
- o funding source - either the Hawaii Department of Business (formerly planning) and Economic Development or the U.S. Department of Energy
- o HDWCP Call No.- derived as explained above
- o pages - the number of pages or sections, where they are individually paged, along with notes indicating number of appendices, maps or drawings, as appropriate
- o abstract - a brief summary of the contents of the report

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1. dBASE III is a registered trademark of Ashton-Tate.

Hardcopies of all state-funded and most federally-funded reports are available at:

Department of Business and Economic Development Library
250 S. King Street, Room 727
Honolulu, Hawaii 96813

Extra copies of some reports are available at:

Department of Business and Economic Development
Energy Division
335 Merchant Street, Room 110
Honolulu, Hawaii 96813

Complete sets of all reports are also kept at the Hawaiian Electric company Environmental Department and at Parsons Hawaii.

The bibliography is listed in the following sections in two ways. Section 2 lists the reports chronologically by subject area. All data fields except the abstracts are shown. Section 3 is a print out by subject area of just the call number, title and abstract fields. The reports appear in the same order in both lists.

Because of the capabilities of the data base software, a report listing any combination of records, fields and order of listing may be generated. DBED, HECO and Parsons each have copies of the entire data base file on 5 1/4" floppy disks suitable for use in an IBM-compatible PC. dBASE III PLUS software is required to work with the data base.

SECTION 2

HDWCP REPORT LISTING

DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
** SUBJECT AREA: General Management and Administration						
1982	General Management Reports	Parsons Hawaii	Chapman, G.A.	Hawaii Department of Planning and Economic Development	001	4 Sections
1982	Management Support Reports	Parsons Hawaii	Chapman, G.A.	Hawaii Department of Planning and Economic Development	002	3 Sections
1984	Program Integration Plan	Parsons Hawaii	Krasnick, G. and G.A. Chapman	U.S. Department of Energy	003	9 Sec+2App
1984	Technical Standards/Engineering Procedures Guidelines	Parsons Hawaii	Chapman, G.A. and G. Krasnick	U.S. Department of Energy	004	10
** SUBJECT AREA: Cable Subsystem						
1982	Development of Candidate Cable Designs for the Hawaiian Deep Water Cable Program	Simplex Wire and Cable Company		Hawaii Department of Planning and Economic Development	101	61 + 2 App
1982	Development of Cable Design for the Hawaiian Deep Water Cable Program (Draft)	Simplex Wire and Cable Company	Traut, R., J. Soden, J. Kurt and R. Costantino	Hawaii Department of Planning and Economic Development	102	111+2App
1982	Development of Preliminary Cable Design for the Hawaiian Deep Water Cable Program	Simplex Wire and Cable Company	Traut, R., J. Soden, J. Kurt and R. Costantino	Hawaii Department of Planning and Economic Development	103	112+3App
1982	Preliminary Prototype Cable Design Criteria	Simplex Wire and Cable Company	Traut, R., J. Soden, J. Kurt and R. Costantino	Hawaii Department of Planning and Economic Development	104	112 + 3App
1983	Cable Design Reassessment (Draft)	Simplex Wire and Cable Company		U.S. Department of Energy	105	50 + 1 App
1985	Cable Transportation from Manufacturing Plant to Hawaii	Hawaiian Dredging & Construction Company	Slayton, M. T.	U.S. Department of Energy	106	6 Sec+1App

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HDWCP REPORT LISTING

DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1985	Cable Subsystem Feasibility Criteria	Parsons Hawaii		U.S. Department of Energy	107	4 Sec
1985	Cable Selection Methodology	Parsons Hawaii		U.S. Department of Energy	108	5 Sec
1985	Test Cable Selection	Parsons Hawaii		U.S. Department of Energy	109	14 Sec
1985	Cable Construction Specification	Pirelli Cable Corporation		U.S. Department of Energy	110	29
1985	Cable Design Parametric Study	Pirelli Cable Corporation and Societa Cavi Pirelli	Silver, D., L. Bonacorsa, G. Bazzi and D. Valenza	U.S. Department of Energy	111	10Sec+5App
1986	Cable Overloadability Study	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	112	17 + 20 Tb
1986	Cable Catenary Study	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	113	16 + 1 App
1986	Cable Repair Rationale	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	114	23 + Maps
1986	Final Design of Flexible Factory and Field Joints and Terminations	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	115	69 + Dwngs
1986	Cable Repair Rationale	Hawaiian Dredging & Construction Co., Pirelli Cable Corporation and Makai Ocean Engineering		U.S. Department of Energy	116	25 + 3 App
1988	Development of Friction Test Specimen for the HDWC System	University of Hawaii, Department of Mechanical Engineering	Knapp, R.M.	Hawaii Department of Business and Economic Development	117	7
1989	Cable Laboratory Test Program Report	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	118	15 Sec+4Ap

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
** SUBJECT AREA: Cable Handling Equipment Subsystem						
1984	Sensitivity Analysis of Western Gear's Conceptual Design of a Tensioning System for the HDWC Program		Vega, L.A.	U.S. Department of Energy	201	17
1984	Conceptual Design Study: Integrated Control System for the HDWC Cable Laying	Makai Ocean Engineering, Inc.		U.S. Department of Energy	202	10 Sec+5Ap
1986	Cable Handling Equipment Subsystem Feasibility Criteria	Hawaiian Dredging & Construction Company		U.S. Department of Energy	203	29
1986	Cable Handling Equipment Concept Study	Western Gear Machinery Co.	Franchuk, J.M., A. Smith, W. Severe and D. Skiles	U.S. Department of Energy	204	4 Sec+2App
1986	Conceptual Design Study: Integrated Control System for the HDWC Cable Laying (Revised)	Makai Ocean Engineering, Inc.		U.S. Department of Energy	205	10 Sec+5Ap
1987	Cable Laying Control and Data Acquisition Systems, Preliminary Design Report	Makai Ocean Engineering, Inc. and Edward K. Noda & Associates		U.S. Department of Energy	206	5 Sec+2App
1988	Cable Laying Control and Data Acquisition Systems: Final Design Report	Makai Ocean Engineering, Inc. and Edward K. Noda & Associates		U.S. Department of Energy	207	96 + 2Apps
** SUBJECT AREA: Cable Vessel Subsystem						
1982	Preliminary Cable Ship Inventory and Capabilities	Morris Guralnick Associates, Inc.		Hawaii Department of Planning and Economic Development	301	19 + 5 App

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1982	Cable Deployment Program Cost Estimates and Cable Vessel Concept Design for Hawaii Deep Water Cable (HDWC) Program	Morris Guralnick Associates, Inc.		Hawaii Department of Planning and Economic Development	302	29 + 2 App
1982	Preliminary Cable Ship Inventory and Concept Design	Morris Guralnick Associates, Inc.	Richardson, R.K.	Hawaii Department of Planning and Economic Development	303	2 Sections
1983	Reassessment of Cable Vessel Availability	Hawaiian Dredging & Construction Company	Lopez, L. and F. McHale	U.S. Department of Energy	304	7 + 6 App
1986	Cable Vessel Subsystem Feasibility Criteria	Hawaiian Dredging & Construction Company	Slayton, M.T., and F. McHale	U.S. Department of Energy	305	29
** SUBJECT AREA: Electrical Grid System						
1983	Preliminary Electrical Grid System Integration Study	Hawaiian Electric Company	Imai, R.M., G.N. Okura and T.C. Simmons	Hawaii Department of Planning and Economic Development	401	56
1984	System Studies (4 Vols.)	Power Technologies, Inc.	Mountford, J.D.	Hawaii Department of Planning and Economic Development	402	5Sec+15App
1986	Phase II-B System Studies (3 Vols.)	Power Technologies, Inc.	Mountford, J.D., A.J. Wood and M.A. Sager	Hawaii Department of Planning and Economic Development	403	8Sec+20App
1986	Hawaii - Oahu HVDC Interconnection Simulator Study	Power Technologies, Inc.	Johnson, B. K.	Hawaii Department of Planning and Economic Development	404	6Sec+14App
1987	HDWC PHASE II-C System Studies	Power Technologies, Inc.	Mountford, J.D.	Hawaii Department of Planning and Economic Development	405	9Sec+25App
** SUBJECT AREA: System Integration and Testing						
1983	System Analysis and Parametric Studies for the Hawaii Deep Water Cable Program: Task 1.1, Literature Survey	EG&G Washington Analytical Services Center, Inc.	Hoech, J.		501	38

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1984	System Analysis & Parametric Studies	EG&G Ocean Systems and Makai Ocean Engineering, Inc.	Vega, L., G. Nihous, J. Hoech, J. Van Ryzin and A. Resnick	U.S. Department of Energy	502	9 Sec +5Ap
1985	Basic Design Criteria Data Book	Parsons Hawaii			503	7 sections
1985	System Feasibility Criteria	Parsons Hawaii		U.S. Department of Energy	504	4 Sections
1985	Evaluation of Options for At-Sea Testing (Revised Draft)	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	505	6 Sections
1985	System Test Plan: Test Objectives, Requirements and Rationale (Final Working Draft)	Parsons Hawaii		U.S. Department of Energy	506	5 Sections
1985	Summary of HDWC Program Minimum At-Sea Test Requirements	Hawaiian Dredging & Construction Company	McHale, F. and L. Lopez	U.S. Department of Energy	507	11
1985	Preliminary Report on Evaluation of Options for HDWC At-Sea Tests	Hawaiian Dredging and Construction Company, Inc.	McHale, F., L. Lopez and J. Van Ryzin	U.S. Department of Energy	508	11
1985	Objectives and Tests for Laboratory Testing of Cable and Joints for the HDWC Program	Pirelli Cable Corporation		U.S. Department of Energy	509	14
1986	Selection and Design of Laboratory Testing Equipment	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	510	14
1986	Laboratory Test Protocol	Pirelli Cable Corporation and Societa Cavi Pirelli		U.S. Department of Energy	511	46
1986	Laboratory Testing of a HVDC Submarine Power Cable for the Hawaii Deep Water Cable Program	Hawaiian Electric Company and Ebasco Services Incorporated	Bonnet, W.A. and T. F. Garrity		512	35

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1987	Conceptual Design of Reduced Scale At-Sea Test (Draft, 2 Vols.)	Hawaiian Dredging & Construction Co. and Makai Ocean Engineering	Hee, R., F. McHale, M. Slayton, L. Lopez, J. Van Ryzin, J. Andres and G. Sheu	U.S. Department of Energy	513	6 Sect. +
1987	Laboratory Testing Requirements for High Voltage Direct Current Submarine Cables (Specification 6337-LT1, Rev. 1)	Parsons Hawaii		U.S. Department of Energy	514	30
1988	Revised Basic Design Criteria Data Book	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Business and Economic Development	515	8 Sections
** SUBJECT AREA: Economics						
1984	Legal, Institutional and Financial Aspects of an Inter-Island Electrical Transmission Cable	Carlsmith, Carlsmith, Wichman and Case and Prudential-Bache Securities, Inc.	Sumida, G.A. and A.L. Hills	Hawaii Department of Planning and Economic Development	601	127
1986	Commercial Cable System Cost Study (Preliminary)	Hawaiian Dredging & Construction Company	Slayton, M.T.	Hawaii Department of Planning and Economic Development	602	5 Sections
1986	Alternative Approaches to the Legal, Institutional and Financial Aspects of Developing an Inter-Island Electrical Transmission Cable System	Carlsmith, Wichman, Case, Mukai and Ichiki and First Interstate Cogeneration Capital Associates	Sumida, G.A., A.L. Hills, P.E. Lee, S.D. Suyat and R.P. Takushi	Hawaii Department of Planning and Economic Development	603	195
1987	Submarine vs Overhead Routing: A Cost Comparison for Molokai	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Planning and Economic Development	604	36

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1988	Undersea Cable to Transmit Geothermal-Generated Electrical Energy from the Island of Hawaii to Oahu: Economic Feasibility	Decision Analysts Hawaii, Inc.		Hawaii Department of Business and Economic Development	605	4 Sections
** SUBJECT AREA: Route Identification						
1982	Preliminary Route Survey Analysis	Parsons Hawaii	Hermann, F.V. and G.A. Chapman	Hawaii Department of Planning and Economic Development	701	5Sec+4App
1983	At-Sea Route Surveys	University of Hawaii, Hawaii Institute of Geophysics	Campbell, J. F.	U.S. Department of Energy	702	51
1983	At-Sea Route Survey Monitoring Reports	Sea Engineering, Inc.	Rocheleau, R. and S. Sullivan	U.S. Department of Energy	703	21 + 4 App
1985	Characterization of Potential Routes and Route Option Selection	The Ralph M. Parsons Co.	Krasnick, G.	U.S. Department of Energy	704	5 Sections
1985	Overland Transmission Corridor Study: Hawaii, Maui, Oahu	DHM Planners, Inc.		Hawaii Department of Planning and Economic Development	705	225
1985	At-Sea Route Surveys, Phase II-B	University of Hawaii, Hawaii Institute of Geophysics	Campbell, J. F.	Hawaii Department of Planning and Economic Development	706	15 + atlas
1986	Preferred Route Analysis	Parsons Hawaii	Krasnick, G.	Hawaii Department of Planning and Economic Development	707	14
1987	Side-Scan Sonar and Swath Bathymetry Mapping Survey of the Preferred Cable Route from Maui to Oahu, Hawaii	Seafloor Surveys International, Inc.		Hawaii Department of Business and Economic Development	708	30

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1988	Overland Transmission Line Corridor Study: Puna to Kohala, Island of Hawaii	DHM Planners, Inc.		Hawaii Department of Business and Economic Development	709	131 + 2App
1988	Feasibility of Using Underground Electrical Cables Along Portions of the Overland Route of an Inter-Island Cable System in Hawaii	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Business and Economic Development	710	31
1988	Visual and Photographic Survey of a Preferred Hawaii Deep Water CAble (HDWC) Route	University of Hawaii, Hawaii Undersea Research Laboratory	Malahoff, A., K.K. Zaiger, A.T. Jones and E.H. Chave	Hawaii Department of Business and Economic Development	711	16 + 5Apps
** SUBJECT AREA: Environmental - Observations, Testing and Analyses						
1983	Evaluation of Expected Operational Wind, Wave and Current Conditions in the Alenuihaha Channel	Edward K. Noda and Associates	Noda, E. K.	U.S. Department of Energy	801	5 Sections
1983	Near-Shore and On-Shore Materials Characteristics	Dames & Moore		U.S. Department of Energy	802	8 Sections
1984	Deep Water Electrical Cable Corrosion Testing	Hawaii Natural Energy Institute, University of Hawaii at Manoa	Larsen-Basse, J.	Hawaii Department of Planning and Economic Development	803	23
1984	Environmental Analyses	Parsons Hawaii	Krasnick, G. and G.A. Chapman	Hawaii Department of Planning and Economic Development	804	130+13 App
1985	Waves and Near-Surface Currents in the Alenuihaha Channel	Edward K. Noda & Associates		U.S. Department of Energy	805	34+8 App

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1985	Summary of Hawaii Deep Water Cable Program	Parsons Hawaii	Krasnick, G.	Hawaii Department of Planning and Economic Development	806	12 + 2 Fig
1985	Data and Observations from Submersible Dives Along the HDWC Program Preferred Submarine Route	Hawaii Undersea Research Laboratory, University of Hawaii at Manoa		Hawaii Department of Planning and Economic Development	807	various
1986	Environmental Review Plan	Parsons Hawaii	Krasnick, G.	Hawaii Department of Planning and Economic Development	808	42
1986	Bottom Roughness Survey of the Alenuihaha Channel	Makai Ocean Engineering, Inc., Edward K. Noda & Associates and Hawaii Institute of Geophysics		U.S. Department of Energy	809	75 + 6 App
1986	Plan for the Second Bottom Roughness Survey Cruise of the Alenuihaha Channel: June, 1986	Hawaiian Dredging & Construction, Inc.	McHale, F. and J. Van Ryzin	Hawaii Department of Planning and Economic Development	810	15 + 6 Fig
1986	Wind Characteristics and General Relationship Between Trade Wind Speeds and Wave Heights in the Alenuihaha Channel	Pacific Weather, Inc.		U.S. Department of Energy	811	35+data
1986	Cable Materials Corrosion and Abrasion Testing	Hawaii Natural Energy Institute, University of Hawaii	Larsen-Basse, J.	Hawaii Department of Planning and Economic Development	812	180
1986	Wave and Near-Surface Current Measurement Program in the Alenuihaha Channel	Edward K. Noda and Associates		U.S. Department of Energy	813	33+5 App

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1986	Environmental Design Criteria for Cable Deployment Operations in the Alenuihaha Channel	Edward K. Noda and Associates		Hawaii Department of Planning and Economic Development	814	100+5 App
1986	Bottom Boundary Layer Currents in the Alenuihaha Channel	Horizon Marine, Inc.	Sanford, T.B.	Hawaii Department of Planning and Economic Development	815	38
1986	High Frequency Wave Analysis for the Alenuihaha Channel	Edward K. Noda & Associates		U.S. Department of Energy	816	33+ App
1986	Alenuihaha Channel Current Measurements: Final Report	Horizon Marine, Inc.		Hawaii Department of Planning and Economic Development	817	5 + data
1987	Visual Impact Analysis of Proposed 300 KVDC Line	DHM Planners, Inc.		Hawaii Department of Planning and Economic Development	818	76
1987	Kohala Slope Near-Bottom Current Measurement Program in the Alenuihaha Channel	Edward K. Noda & Associates		Hawaii Department of Planning and Economic Development	819	30+10 App
1987	Second Bottom Roughness Survey	Makai Ocean Engineering, Inc. and Scripps Institution of Oceanography		Hawaii Department of Planning and Economic Development	820	33 + 2 App
1987	Hydrogen Sulfide in Sediments Along the Preferred Submarine Cable Route	Parsons Hawaii	Krasnick, G.	Hawaii Department of Planning and Economic Development	821	8 + 1 App
1987	Environmental Constraints to use of a Sea Electrode in a Submarine Electrical Transmission Cable System in Hawaii	Parsons Hawaii	Krasnick, G.	Hawaii Department of Planning and Economic Development	822	20

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1987	Analysis of Seafloor Surveys, Inc. Precision Bottom Data Between Maui and Oahu in Determination of a Potential Cable Route	Makai Ocean Engineering, Inc.		Hawaii Department of Planning and Economic Development	823	8 + 4 Fig
1987	Environmental Assessment	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Planning and Economic Development	824	197+1 App
1988	Maui Slope Near-Bottom Current Measurement Program in the Alenuihaha Channel	Edward K. Noda and Associates, Inc.		Hawaii Department of Business and Economic Development	825	46 + 7 App
1988	Abrasion-Corrosion Studies	University of Hawaii, Department of Mechanical Engineering and Georgia Institute of Technology	Liebert, B.E., K. Htun, A. Tadjvar and J. Larsen-Basse	Hawaii Department of Business and Economic Development	826	65
1988	A Shore-based Sea Electrode System for a Submarine Electrical Transmission Cable System in Hawaii	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Business and Economic Development	827	25
** SUBJECT AREA: Public Information						
1982	Program Review	Hawaiian Electric Company and Parsons Hawaii	Okura, G.N. and G.A. Chapman	Department of Planning and Economic Development	901	17
1982	Phase I Executive Summary	Hawaiian Electric Company and Parsons Hawaii	Okura, G.N. and G.A. Chapman	Hawaii Department of Planning and Economic Development	902	16
1983	The Hawaii Deep Water Cable Program: Submarine Power Cable Installation in an Adverse Environment	U.S. Department of Energy and Hawaiian Electric Company, Inc.	Eaton, R. III, and W. A. Bonnet	U.S. Department of Energy	903	8

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DATE	TITLE	CORPORATE AUTHOR	AUTHORS	FUNDING SOURCE	CALL NO	PAGES
1983	Public Informational Program	Hawaiian Electric Company and Parsons Hawaii	Shirai, S., G.N. Okura and G.A. Chapman	Hawaii Department of Planning and Economic Development	904	12
1984	Phase II-A Executive Summary	Hawaiian Electric Company and Parsons Hawaii	Okura, G.N., G.A. Chapman and G. Krasnick	Hawaii Department of Planning and Economic Development	905	34
1984	Progress Update - 1984	Parsons Hawaii	Krasnick, G.	Hawaii Department of Planning and Economic Development	906	9
1986	Phase II-B Executive Summary	Parsons Hawaii	Mansur, J. and G. Krasnick	Hawaii Department of Planning and Economic Development	907	39
1986	Assessing and Managing Potential Health and Safety Issues Related to High Voltage Direct Current Transmission Lines	Environmental Research Information, Inc.		Hawaii Department of Planning and Economic Development	908	
1987	A Review of Hawaii Deep Water Cable Program and Geothermal Development in Hawaii	Hawaiian Electric Company, Inc.		Hawaii Department of Planning and Economic Development	909	7
1987	Phase II-C Executive Summary	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Planning and Economic Development	910	27
1986	Public Information Program for the HDWC Program	Parsons Hawaii	Mansur, J.	Hawaii Department of Business and Economic Development	911	16+4Attch.
1988	HDWC Program Bibliography	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Business and Economic Development	912	3 Sections
1988	Phase II-D Executive Summary	Parsons Hawaii	Krasnick, G. and J. Mansur	Hawaii Department of Business and Economic Development	913	27

SECTION 3
HDWCP REPORT ABSTRACTS

CALL NO	TITLE	ABSTRACT
** SUBJECT AREA General Management and Administration		
001	General Management Reports	This document contains the Program Management Plan which was prepared to identify and specify the administrative, technical and fiscal functions and controls to be utilized during the HDWC Program. It also contains the Work Breakdown Structure which provides a planned approach for the full integration of all Program technical and control functions. The Quality Assurance Plan, also described, was prepared to document that all work is proceeding on schedule and within budgetary constraints. Finally, the Program Mobilization Plan, prepared to describe the activities and actions of HDWC Program participants at the initiation of future phases of work, is outlined.
002	Management Support Reports	This document, in concert with the General Management Reports, constitutes HDWC Program definition. The Program schedule, a cost summary for Phases II-A, II-B and II-C, and a preliminary planning level schedule provide a foundation for the Program to meet its goals.
003	Program Integration Plan	The Program Integration Plan identifies the approach, techniques and management tools utilized to ensure that the HDWC Program objectives are accomplished in an accurate, timely and cost-effective manner. This plan ensures that all Program participants are working toward common objectives, using uniform criteria, procedures and documentation for their work.
004	Technical Standards/Engineering Procedures Guidelines	This document provides all HDWC Program participants with standards and procedures to be followed during the performance of technical task work and the preparation of all program management and technical reports.
** SUBJECT AREA Cable Subsystem		
101	Development of Candidate Cable Designs for the Hawaiian Deep Water Cable Program	This report details progress in the design and evaluation of a 250 kVdc submarine power cable intended for installation in the Alenuihaha Channel. The objective is to develop a Preliminary Prototype Cable Construction Memorandum for the manufacture of test lengths of the cable. Sixteen candidate cable designs, including both mass-impregnated and self-contained oil-filled (SCOF) designs, were considered. Design variations included aluminum and copper conductors, lead and aluminum hermetic sheathing and four strength member concepts. Five designs were analyzed in more detail, and one, an aluminum-conductor, solid paper insulation, double round jacketed galvanized steel armor cable, selected as the preferred preliminary design.
102	Development of Cable Design for the Hawaiian	This report is a draft of HDWCP No. 103. The HDWC Program is briefly described, as are state-of-the-art, high voltage submarine power cables. General cable design

SECTION 3
HDWCP REPORT ABSTRACTS

CALL NO	TITLE	ABSTRACT
	Deep Water Cable Program (Draft)	requirements, baseline designs and a summary of preferred designs are presented. Cable testing and manufacture are also discussed. A bibliography, glossary and three appendices are attached.
103	Development of Preliminary Cable Design for the Hawaiian Deep Water Cable Program	In this early report, general cable design requirements and general descriptions of cable design options are described. Baseline designs and preferred designs are discussed, laboratory testing of the cable (both electrical and mechanical) is introduced, and development of innovative cable designs is suggested. Cable economics are discussed in terms of price per foot as are electrical losses that occur in an HVDC transmission system.
104	Preliminary Prototype Cable Design Criteria	This report details the early progress in the design and evaluation of a 250 kVdc submarine power cable intended for installation in 7000 feet of water in the Alenuihaha Channel. This document summarizes HVDC submarine power cables state-of-the-art, general requirements for cable design, baseline designs and preferred designs. The various types of cable testing are also summarized. A bibliography, glossary and three appendices are attached.
105	Cable Design Reassessment (Draft)	The objective of this report is to predict the mechanical stresses and strains within the cable during installation for four different HDWC Program cable designs. The stresses and strains predicted for a selected group of similar deep water power cables are also shown. Analysis is performed for a straight cable under the tension of installation, and then additional bending and torsional stresses as a result of bending the cable over the overboarding sheave are predicted and superimposed on the straight cable stresses. The hydraulics of SCOF cables for the Hawaii application are discussed and included as an appendix.
106	Cable Transportation from Manufacturing Plant to Hawaii	This document presents a summary of trade-off studies conducted to evaluate alternative methods for transporting the cable from the manufacturing plant to Hawaii. Both the HDWC Program and the commercial system installation are addressed. Major topics covered in the report include cable manufacturing firms' abilities, cable transporting scenarios, cable transportation costs, and the pros and cons of using the cable lay vessel or another vessel to transport the cable.
107	Cable Subsystem Feasibility Criteria	This document presents the definition, basis, development and use of the HDWC Program cable sybsystem feasibility criteria and summarizes the detailed criteria, the associated verification requirements and related hardware interfaces. Also included is a summary of cable system technical risk issues.
108	Cable Selection Methodology	The Cable Selection Methodology identifies cable design "Candidates;" provides the basis for and definitica of cable "Candidate" selection criteria; describes the cable design

SECTION 3
HDWCP REPORT ABSTRACTS

CALL NO	TITLE	ABSTRACT
		technical selection methodology; and indicates the factors utilized in the evaluation of cable system costs.
109	Test Cable Selection	This report discusses the information needed to select a test cable suitable for use in a commercial cable intertie between the Islands of Hawaii and Oahu. Cable selection encompasses consideration of many factors. Data on cable designs and routes are included in this report. The selection methodology and the evaluation sequence are also reviewed. The final cable selection is discussed.
110	Cable Construction Specification	This document constitutes a detailed construction specification covering the design, fabrication and testing of the preferred 250 MW dc self-contained oil-filled (SCOF) cable to be used for the laboratory test portion of the HDWC Program. All cable materials, components, details of cable fabrication and test requirements are fully described. This specification incorporates a level of technical detail sufficient to permit an experienced cable manufacturer to produce a length of cable.
111	Cable Design Parametric Study	This report documents the parametric study performed by Pirelli Cable Corporation to identify the deep water submarine cable designs capable of satisfying the requirements of the HDWC Program. Of the several thousand cable designs that were initially considered, 251 cable designs were selected for in-depth evaluation. Of these, 192 were identified as satisfying the fixed design and external parameters established for the study and the internal parameters and constraints imposed by Pirelli based on recognized international standards and previous submarine cable experience. Important conclusions based on the results of the study are that technical feasibility appears to be achievable by use of cable designs which are within the existing state-of-the-art and that only aluminum conductor cable designs are capable of satisfying all of the requirements of the Program including crossing of the Alenuihaha Channel. Copper conductor cable designs are not suitable at the maximum design water depth of 2134 m (7000 ft) due to mechanical strength considerations. Five appendices are attached.
112	Cable Overloadability Study	The scope of this study is to determine the short-term overload capability of Cable No. 116 in the event of the loss of one pole of the dc transmission system. Such a loss would mean the loss of 250 MW of transmitted power, exceeding the spinning reserve capacity of Hawaiian Electric Company's Oahu generating stations. Cable data, thermal calculations, hydraulic calculations, electric calculations and a discussion of the results are included. Both summary data and computer printouts of design data are attached.
113	Cable Catenary Study	A catenary, or unsupported span in the cable, could reduce cable life by deformation and breakage in conductor wires due to abrupt bends or by abrasion at suspension points.

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		This study is divided into two parts. The first addresses the allowable bending radius of the cable on outcrops of the channel bottom. The second examines the mechanical fatigue life of the lead sheath when the cable is subjected to the action of tidal currents producing cable movements on supporting rocks. Numerous tables and figures illustrate this information.
114	Cable Repair Rationale	This report discusses the methodology for cable repair with respect to water depth and seabed profile. Detailed analyses of bottom conditions are divided into two sections: Oahu to Maui and Maui to Hawaii. Four types of cable failures are described: mechanically induced failures, natural phenomena induced failures, electrical faults and failure by unknown cause. An evaluation is included of external cable protection, such as burial of the cable along sections of the route where damage is most likely to occur. A classification of cable repair sites is described. The sequence of events in a repair operation and the cable vessel, equipment and personnel requirements are outlined, along with an estimated time schedule for a repair. Finally, numerous cable and fault detection systems are described.
115	Final Design of Flexible Factory and Field Joints and Terminations	This document constitutes a detailed construction specification covering the design and fabrication requirements for the flexible 'factory' and 'repair' joints to be included in the 250 MW dc self-contained oil-filled (SCOF) cable lengths which will be used for the laboratory test segment of the HDWC Program. All materials, components and details of joint fabrication are fully described in such a way as to permit an experienced manufacturer to produce the joints. Information is also provided about the terminations which are necessary for carrying out the electrical tests on cable lengths containing joints. All mechanical and electrical tests referred to in this document are specified in detail in the 'Laboratory Test Protocol' report.
116	Cable Repair Rationale	This report builds on the earlier "Cable Repair Rationale" report by Pirelli (HDWCP No. 114). The Pirelli report is summarized and included as Appendix A. Two additional appendices explore other significant aspects of cable laying and repair. Appendix B addresses the issue of embedment of a cable, including methodologies appropriate at various water depths, probable hazards to the system at various depths and additional protective measures possible at shoreside landing points. Appendix C discusses the use of submersibles and remote operated vehicles to assist in repair of a submarine cable system.
117	Development of Friction Test Specimen for the HDWC System	The objective of this work was to improve the accuracy of analytical modeling of self-contained oil-filled (SCOF) power cables. The effort focused of the effects of cable laying on component stresses at the overboarding sheave (or chute) where maximum

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		tensile and bending actions occur. Because existing computer models are incapable of representing frictional actions between the components of the cable, a physical model was fabricated of acrylic plastic and instrumented with strain gages and optical measuring devices. Preliminary optical measurements were made. Tests will be continued using sources of funding outside the HDWC Program. Complete test results and modeling implications are to be published in the open literature.
118	Cable Laboratory Test Program Report	The "Cable Design Parametric Study" performed by Pirelli (HDWCP No. 111) provided alternative designs for a commercial cable system to link the Hawaiian Islands. The "Test Cable Selection" (HDWCP No. 109) identified alternative No. 116 as the preferred design for testing in the HDWC Program. A series of reports culminating in a laboratory test specification document (HDWCP No. 514) defined the objectives, apparatus and test protocol for tests of a sample of Cable No. 116. The present report describes in detail the tests conducted and the results of the tests. Categories of tests included baseline electrical, high stress tensile, static flexural rigidity, dynamic flexural rigidity and damping coefficient, crushing, repeated flexure, bending, oscillation, external pressure, and internal pressure. In all cases, accepted industry standards were met or exceeded. Additional tests that reflected the special conditions of the expected route were added and the cable also passed all of these tests.
** SUBJECT AREA Cable Handling Equipment Subsystem		
201	Sensitivity Analysis of Western Gear's Conceptual Design of a Tensioning System for the HDWC Program	The tensioning system for cable laying operations is analyzed in this report using mathematical modeling. The baseline tensioning system, sensitivity analysis, and optimization of the tensioning system are described and discussed.
202	Conceptual Design Study: Integrated Control System for the HDWC Cable Laying	One of the many challenges associated with the HDWC Program is designing an integrated control system for the cable deployment vessel that will be able to accurately integrate data from a variety of cable and vessel sensors, monitor the vessel location and control the cable payout rate and vessel position. The intent of this study is to provide a conceptual design for an integrated control system that identifies its basic method of operation and the equipment required, and to determine potential problem areas. Appendices include (1) Cable Locating Acoustics, (2) Navigation Brochures, (3) Technical Description of Available Tugs, (4) Technical Description of Available Thrusters and (5) Controller.
203	Cable Handling	The Cable Handling Equipment Subsystem is a major hardware component of the baseline

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	Equipment Subsystem Feasibility Criteria	commercial cable system. The Feasibility Criteria document defines the functions of this subsystem, establishes performance requirements, and specifies the feasibility criteria (divided into nine categories) by which the subsystem hardware and performance will be evaluated.
204	Cable Handling Equipment Concept Study	In this study, the HDWC Program At-Sea Test requirements of high cable tensions and sea states were evaluated against present state-of-the-art cable handling equipment to formulate recommendations for successful completion of the program. Equipment requirements for a baseline commercial program were also evaluated. Numerous tables and figures illustrate the study results.
205	Conceptual Design Study: Integrated Control System for the HDWC Cable Laying (Revised)	This study is a revision of an earlier work, HDWCP No. 202. It provides a conceptual design for an integrated control system for the commercial cable deployment vessel. Basic methods of operation, equipment required, and potential problem areas are identified. The entire control system is illustrated by block diagram. Summaries of control system selection processes for the HDWCP test program and for a commercial cable system in Hawaii are presented.
206	Cable Laying Control and Data Acquisition Systems, Preliminary Design Report	This report describes hardware selection for the At-Sea Test in the Alenuihaha Channel. Progress in the development of the cable laying control and data acquisition systems since the previous report, "Conceptual Design of Reduced Scale At-Sea Test," is described.
207	Cable Laying Control and Data Acquisition Systems: Final Design Report	This report describes the Integrated Control System (ICS), the Data Acquisition System (DAS), and data collection systems designed for the At-Sea Test phase of the HDWC Program. Two previous reports on the control system for laying the cable are: "Conceptual Design of Reduced Scale At-Sea Test" (HDWCP No. 513) and "Cable Laying Control and Data Acquisition Systems: Preliminary Design Report" (HDWCP No. 206). These documents provided a detailed description of the At-Sea Test and the performance requirements for the cable laying control system. This report is primarily an update of the hardware and the physical description of the system.
** SUBJECT AREA Cable Vessel Subsystem		
301	Preliminary Cable Ship Inventory and Capabilities	This report explores the usability, availability and cost of cable vessels potentially capable of deploying and retrieving the proposed HDWC Program test cable and a commercial cable. Tasks reported on are: 1. Cable Ship Literature Survey, 2. Field Survey of Cable Ships in the United States, and 3. Cable Ships' Applicability to the Program.
302	Cable Deployment	This report provides a program scenario, time schedule, and cost estimate for the

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	Program Cost Estimates and Cable Vessel Concept Design for Hawaii Deep Water Cable (HDWC) Program	deployment and retrieval of the test cable. It includes planning, system and component design, equipment fabrication and cable vessel outfitting, cable transport, mobilization, sea trials, and cable deployment. A cable vessel concept design and cost estimate are also included. A vessel equipment list and weights, vessel arrangement drawing, and linear cable machine information are appended.
303	Preliminary Cable Ship Inventory and Concept Design	This report supplements the preliminary cable ship inventory (HDWCP No. 301) with a conceptual program scenario, schedule and cost estimate. It also contains a conceptual design and a cost estimate for a cable vessel.
304	Reassessment of Cable Vessel Availability	This document includes a March, 1983 "Report on Cable Ship Availabilities" (Appendix A), and an update of the March, 1982 report "Preliminary Cable Vessel Ship Inventory and Capabilities," both by Morris Guralnick Associates, Inc. A summary of required modifications to the candidate vessels for the range of cable characteristics specified by Simplex Wire and Cable Co. is included as Appendix B. Hawaiian Dredging and Construction Co. prepared and submitted an RFP (Appendix C) to owners/operators of the candidate cable vessels, and received replies from Santa Fe Engineering (Appendix D), Pirelli Cable Corporation (Appendix E), and Chugach Electric (Appendix F). Criteria upon which the proposals were evaluated are listed and comments on the proposals provided.
305	Cable Vessel Subsystem Feasibility Criteria	The Cable Vessel Subsystem (CVSS) is a major hardware component of the baseline commercial cable system. The CVSS Feasibility Criteria document defines the functions of the CVSS, establishes performance requirements, and specifies the feasibility criteria (divided into nine categories) by which the subsystem hardware and performance will be evaluated.
** SUBJECT AREA Electrical Grid System		
401	Preliminary Electrical Grid System Integration Study	The purpose of this study is to develop a preliminary conceptual plan for an interisland cable system. Parameters relating to the interisland system configuration based on load profiles, integration of alternate energy technologies and impacts on present electrical power generation methods are defined. A preliminary definition of system integration investigations for future phases of work is also developed. This study precedes more detailed system studies performed by Power Technologies, Inc.
402	System Studies (4 Vols.)	This four-volume report describes the details of integrating geothermally-generated electrical power into the HECO system through a unified State-wide grid. Included are: a discussion of electric power transmission load-flow, overvoltage and stability; an analysis of the optimum voltage level for the inter-island link; an evaluation of the

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		optimum inter-island link configuration; cost of system development; energy production costing; system operation; general feasibility and environmental concerns. The appendices to this report include load-flow plots, dynamic plots, detailed criteria and all relevant data used and/or gathered during the course of the study.
403	Phase II-B System Studies (3 Vols.)	This report expands on the Phase IIA System Studies, which assumed a point-to-point, Hawaii to Oahu system, and introduces economic and technical evaluations of a possible link on Maui, making the commercial cable system a multi-terminal HVDC network. This report also discusses economic feasibility, with the price of oil the most important parameter in the evaluation. Included are reliability studies, production cost studies, overhead line design studies, system studies, and economic studies. Appendices to this report (Volumes II and III) include the input data and other information received from HECO as well as bulk output from the study work such as load-flow plots, dynamic plots and production-cost program output.
404	Hawaii - Oahu HVDC Interconnection Simulator Study	This report documents the results of an HVDC simulator study of the proposed link between Hawaii and Oahu. Power Technologies, Inc. directed the study using the General Electric simulator in Schenectady, New York. The purpose of this study is to explore the feasibility of the HVDC interconnection, identifying any unusual operating constraints or control and equipment requirements. Time and budgetary constraints permitted representation of only a two terminal monopolar equivalent of the bipolar link. No intermediated tap was considered. The modeling of the DC system and controls, the modeling of the AC system, and the simulator results are described. Fourteen appendices are attached to the report.
405	HDWC PHASE II-C System Studies	The studies reported here are a continuation of those previously reported for Phases II-A and II-B of the HDWC Program. The major components of this Phase II-C effort are: 1. An exploration by the Ben Holt Co., of the technical and economic feasibility of developing up to 500 MW of geothermal capacity along the East Rift Zone of the Kilauea Volcano on the Big Island, 2. Digital and analog analyses of the transient performance of a conceptual, 500 kV, HVDC transmission system to seek out possibly difficult operational and equipment aspects of an extensive underwater cable scheme, 3. A review of the economic analyses performed in previous phases of the HDWC project in light of changing forecasts of fuel prices, 4. An evaluation of system operational aspects for HECO and MECO in light of the proposed importation of a significant block of power from the Big Island, 5. A review of HECO's existing power plants to identify the characteristics of current operating practices and the means by which operation of existing units can be extended to widen operating limits, and 6. An identification of a

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		conceptual 500 MW scheme and the modifications necessary in the operation and configuration of the existing HECO network. The results of this work and 25 appendices are contained in three volumes of text.
** SUBJECT AREA System Integration and Testing		
501	System Analysis and Parametric Studies for the Hawaii Deep Water Cable Program: Task 1.1, Literature Survey	Public domain technical literature as well as U.S. Navy and private industry analysts and designers were surveyed in order to assess the state of practice and knowledge in the simulation and analysis of submarine power cable laying operations. The primary objective was to identify uncertainties involved in the analysis of motions and loads to be imposed by the environment and vessel on generic cables proposed for the HDWC project. This report was a precursor to actual computer modeling reported on in "System Analysis & Parametric Studies."
502	System Analysis & Parametric Studies	This report documents a study to identify computer-aided methodology to simulate the response of the cable/vessel system to the dynamic ocean environment, and to exercise the methodology to characterize the response of baseline cable designs laid from generic vessels. The state of practice and knowledge in the simulation and analysis of submarine power cable laying operations is reviewed; the range of expected cable mechanical properties is presented; the set of analytical tools selected to simulate cable/vessel interactions during laying operations is documented; a deployment scenario is developed for the test lay in the Alenuihaha Channel; and previous HDWCP reports on cable-laying vessels are reviewed. An addendum titled "Cable Tension During Laying Operations From 180m (600') and 240m (800') Barges" is included along with five appendices and numerous figures and tables.
503	Basic Design Criteria Data Book	This book is a reference manual that identifies the major basic design elements and criteria to which the cable, cable vessel and cable handling equipment subsystems must operate. Environmental and route factors and the electrical grid system for a commercial cable system are summarized. The book uses diagrams and key point outlines rather than narrative text, and is not meant to replace detailed technical reports, drawings or specifications. A bibliography of basic design criteria references is included.
504	System Feasibility Criteria	The System Feasibility Criteria described in this document are required to support a number of tasks in the HDWC Program. These criteria provide top-level technical standards against which the technical feasibility of deploying and operating the baseline commercial cable system will be determined.
505	Evaluation of Options	This document provides an evaluation of options for at-sea tests for the purpose of

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	for At-Sea Testing (Revised Draft)	identifying alternatives potentially lower in cost than the full-scale test originally conceived for the program. Critical characteristics of Cable No. 116, the preferred cable for the program, which must be duplicated in any surrogate cable are defined and discussed. Twelve surrogate cable designs are analyzed and their characteristics compared with the critical characteristics of Cable No. 116. Four cable designs were found inadequate in one or more respects. Eight of the surrogate cables were fully evaluated, a weighting factor applied to each critical characteristic and a technical rating assigned to each cable. The cost of each of these cables was determined. The impact on the laboratory test program of using a surrogate cable or over-squeezing Cable No. 116 in the At-Sea Test is discussed.
506	System Test Plan: Test Objectives, Requirements and Rationale (Final Working Draft)	This plan is one of four documents to be prepared specifically for the HDWC Program tests. The objectives, requirements and rationale for laboratory and at-sea tests of the cable, cable vessel and cable handling equipment are described. General programmatic, technical and scheduling implications are also discussed.
507	Summary of HDWC Program Minimum At-Sea Test Requirements	This brief summary describes the major features of the cable, the cable laying concept, technical challenges to be met and the minimum requirements for the at-sea test necessary to satisfy HDWC Program objectives. The location of the at-sea test is described and test measurements are outlined. Three "non-requirements" are also listed to clarify the goal of the at-sea test.
508	Preliminary Report on Evaluation of Options for HDWC At-Sea Tests	This report presents the preliminary results of evaluations of three alternative approaches to determining the technical feasibility of deploying and operating a commercial interisland cable: 1) a full scale at-sea test with an electrical grade submarine cable, 2) a reduced scale at-sea test using a surrogate cable, and 3) no at-sea test-reliance on physical models and computer simulations. The various merits and drawbacks of each of these three alternatives are explored.
509	Objectives and Tests for Laboratory Testing of Cable and Joints for the HDWC Program	This document provides a list of objectives and associated tests recommended by Pirelli Cable Corporation for the laboratory test program to be performed on cable No. 116, factory flexible joints and at-sea/repair joints. Current industry practices employed for testing of high voltage dc submarine cables are included.
510	Selection and Design of Laboratory Testing Equipment	This document incorporates listings of the testing and measuring equipment to be used in the performance of the mechanical and electrical tests described in the Laboratory Test Protocol (HDWCP No. 511). The listing, by required laboratory test, includes equipment quantities and sources. Following the listings of equipment, justifications are provided for the necessity to design a number of significant pieces of equipment by

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		Pirelli specialists.
511	Laboratory Test Protocol	The Laboratory Test Protocol described in this document was developed to demonstrate technical feasibility of the cable system and incorporates: 1) mechanical tests on the cable system to simulate stresses likely to be experienced during installation, recovery and under operating conditions, including tidal currents and bottom currents, over at least a thirty-year life and 2) electrical tests to demonstrate a life expectancy of greater than thirty years under the anticipated mechanical stresses. Summary charts of the tests are provided. An appendix of Qualification Tests is included.
512	Laboratory Testing of a HVDC Submarine Power Cable for the Hawaii Deep Water Cable Program	The laboratory program, the rationale behind its development and its relationship to other elements of the HDWC Program are the focus of this paper presented to Edison Electric Institute, Transmission and Distribution Committee. The paper also includes a general HDWC Program summary.
513	Conceptual Design of Reduced Scale At-Sea Test (Draft, 2 Vols.)	This comprehensive document reports on the following HDWC Program investigations: Submarine route surveys, ocean environment design criteria, power cable design, determination of technical feasibility, conceptual design of the reduced-scale At-Sea Test and the At-Sea Test program. Under the topic of the reduced-scale At-Sea Test are discussions of surrogate cables, cable vessels and cable handling equipment, the integrated control system and the At-Sea Test protocol. Numerous figures illustrate this information. Under separate cover are fourteen appendices.
514	Laboratory Testing Requirements for High Voltage Direct Current Submarine Cables (Specification 6337-LT1, Rev. 1)	This specification describes the Laboratory Testing Requirements for a test length of HVDC submarine cable for the HDWC Program. The cable selected is of the self-contained oil-filled (SCOF) type. This document specifies mechanical and electrical tests, suggests the required test and measuring equipment, and lists the data to be reported.
515	Revised Basic Design Criteria Data Book	This book is an update of HDWCP No. 503. It summarizes the major basic design elements and criteria for all HDWC subsystems as presently defined. Environmental and route factors are summarized as are electrical grid system integration parameters. A section on the At-Sea Test has been added, and the bibliography is updated.
** SUBJECT AREA Economics		
601	Legal, Institutional and Financial Aspects of an Inter-Island	This preliminary study reviews and analyzes the international, national, state and local laws, rules and regulations which would apply to a cable system; analyzes the laws, rules and regulations which would affect the capital accumulation, ownership and

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	Electrical Transmission Cable	operation of a cable system; and reviews the financial considerations, approaches and specific sources of capital which would affect the financing of a cable system.
602	Commercial Cable System Cost Study (Preliminary)	This document presents the results of a preliminary study which was conducted to develop an estimate of the total cost to install the underwater portion of the commercial power cable system between the Islands of Hawaii and Oahu. This work was done in support of the State-funded portion of Phase II-C of the HDWC Program. All estimates provided by the report are engineering estimates based on the current (1986) status of the interisland cable system design. This document was not finalized.
603	Alternative Approaches to the Legal, Institutional and Financial Aspects of Developing an Inter-Island Electrical Transmission Cable System	Based on the conclusions and recommendations of the "Preliminary Analysis," this study delineates three comprehensive alternative scenarios for the development, financing, construction, ownership, regulation and operation of a cable system. This report also discusses the advantages of a fast-track permitting system for development of the cable system and relates this to the development of the geothermal resource on the Big Island.
604	Submarine vs Overhead Routing: A Cost Comparison for Molokai	The objective of this comparative cost analysis is to quantify and compare the costs for system installation along a preferred submarine route with these for an "alternative" route which proceeds overland on Molokai. Two types of costs are taken into consideration: installation costs and costs related to land use issues. The question addressed is whether or not an overhead segment across Molokai is truely less costly than a submarine cable bypassing the island if the costs of environmental impact mitigation and schedule delays due to land use controversies are factored in. This report includes an environmental assessment of a potential overland route on Molokai and a discussion of alternative energy development and land use disputes in Hawaii. Costs are tabulated and results and recommendations presented.
605	Undersea Cable to Transmit Geothermal-Generated Electrical Energy from the Island of Hawaii to Oahu: Economic Feasibility	This independent analysis to determine the economic feasibility of the geothermal/transmission system presents a plan for system development, including key components, capacities, and a development schedule. The cost of avoided items (imported fuel oil) is derived and converted to a breakeven cost (cents per kilowatt hour) which the electric companies could pay for geothermal-generated electrical energy. The cost to develop and operate the system, and financing of the system via a cable transmission charge is presented and the expected profitability of geothermal operations is addressed. The analysis covers expected revenues, development and operating costs, financing, profitability, sensitivity in the results to selected changes in assumptions,

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		economic risks, and impacts on tax revenues.
** SUBJECT AREA Route Identification		
701	Preliminary Route Survey Analysis	This report describes the preliminary survey of potential routings for a HVDC power transmission cable system between the Islands of Hawaii and Oahu. Factors that guided the analysis, including general environmental conditions overland and in the channels, are described as to how they affect routing possibilities. Over forty route segments are identified and described and areas requiring further study are acknowledged.
702	At-Sea Route Surveys	This document includes a selected bibliography of published articles with relevance to the submarine geology of Hawaii, shows compiled bathymetric maps based on existing data, and reports on three cruises to gather data needed for the analysis of the bottom characteristics in the Alenuihaha Channel. Different geophysical tools used to gather information on the character of the sea floor are described, photographs of various bottom characteristics are shown and physical properties of ocean bottom samples are discussed. Finally, two alternative routes across the deeper portions of the Alenuihaha Channel are described. Descriptions of physical properties of samples collected for the HDWC Program are included in an appendix.
703	At-Sea Route Survey Monitoring Reports	A detailed route survey of the Alenuihaha Channel area that will be used for at-sea deployment of a test length of cable was conducted as a part of the HDWC Program. The objective of the survey was to determine the bathymetry, geologic character and bottom sediment characteristics of the Alenuihaha Channel and to better understand the thermal resistivity of typical sediments of the channel bottom. The scope of work for the Hawaii Institute of Geophysics includes bottom sampling, mapping, bottom photography and sediment thickness measurements. The scope of work for Sea Engineering, Inc. included technical services for at-sea monitoring of the survey work on board and also preliminary review of cruise activities. This report describes the first cruise. The Cruise Plan and Cruise Log for the first cruise and summary reports for the second and third cruise are appended.
704	Characterization of Potential Routes and Route Option Selection	This report describes the investigations and analyses which have contributed to the definition of three route options for a baseline commercial submarine electrical transmission cable system in Hawaii. Twelve figures illustrate the information.
705	Overland Transmission Corridor Study: Hawaii, Maui, Oahu	This report describes potential overland corridors for installation of a 300 kVdc transmission line on the Islands of Hawaii, Maui and Oahu. Previously identified study areas on each island are analyzed, including northwest Hawaii, southern Maui, and southeast Oahu. Delineation of corridors is based on an analysis of constraints posed

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		by exclusion areas and geophysical, biological, socio-economic, and cost factors. Fourteen factors and their respective degrees of constraint and four exclusion factors were mapped and overlayed to show the composite effect of all constraints and exclusion areas. The corridors identified in this report would become the basis for future investigations of detailed alignments for electric transmission lines. A glossary of technical terms, one appendix on design criteria for the transmission line system, and an extensive bibliography are included.
706	At-Sea Route Surveys, Phase II-B	The primary purposes of the Phase II-B At-Sea Route Surveys were to gather available data on the submarine topography surrounding the Hawaiian Islands from Oahu to the northern section of the Island of Hawaii, and to compile these data on charts to: 1) help identify potential hazards to a commercial submarine power cable system and 2) identify those areas needing further surveys. General bathymetric charts (Appendix A) were produced at a scale of 1:100,000 with 25 meter contours, and areas of special interest were plotted at 1:20,000 with a contour interval of 10 meters.
707	Preferred Route Analysis	The purpose of this report is to revise the conceptual "preferred route" to reflect information gained in Phase II-B of the HDWC Program. Using primarily the "Overland Transmission Corridor Study," the "At-Sea Route Surveys" and the previously preferred route, a new map of the preferred cable route was produced. A revised table displaying the distance and depth characteristics of the new preferred route is presented. The route is divided into four types of areas: overland transmission line corridor, submarine cable corridor, cable landing sites, and shoreside facility sites. Factors considered in selecting routes through each type of route environment are listed in outline form. The new preferred route is also described in narrative text.
708	Side-Scan Sonar and Swath Bathymetry Mapping Survey of the Preferred Cable Route from Maui to Oahu, Hawaii	This report and its separate atlas volumes describe the results of precision mapping of the sea floor between Maui and Oahu. A high resolution system combining side-scan sonar and swath bathymetry (the SSI SeaMARC/S system) was used. The purpose of the study was to detect the presence of any serious potential obstacles to deployment or operation of a cable system, and if found, to determine if alternate submarine routes exist. All significant bottom features were imaged to provide information on texture and bottom character, and bathymetry to as precise as +/- one meter was determined. Atlas 1 contains the original ship tracks. Atlas 2 presents in 33 panels geographically correct mosaics of the side-scan sonar data with overlays of bathymetry contoured at five-meter intervals. A descriptive interpretation of each panel is contained in the report.
709	Overland Transmission Line Corridor Study:	This report supplements the previous overland transmission corridor study which described potential corridors within the Kohala region on the island of Hawaii and on

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	Puna to Kohala, Island of Hawaii	Maui and Hawaii. This report describes the remaining area of the Island of Hawaii, namely the area between the geothermal resources in the Puna region and the Kohala region. Delineation of these corridors is based on an analysis of various environmental, social and economic factors. Fifteen data factors and their respective degrees of constraint and five exclusion factors are mapped and overlayed to show the composite effect of all constraints and exclusion areas. The composited maps highlight areas of opportunity which are delineated as potential corridors. The corridors identified in this report are the basis for future investigation of detailed alignments for electric transmission lines. A total of ninety-nine exhibits (maps) illustrate the broadscale analysis.
710	Feasibility of Using Underground Electrical Cables Along Portions of the Overland Route of an Inter-Island Cable System in Hawaii	As one means to mitigate potential negative visual impacts resulting from installation of high voltage overhead transmission lines, the feasibility of using underground cables for portions of the commercial intertie was examined. System requirements are briefly described, and previous underground transmission experience in Hawaii is summarized. Technical aspects of underground systems are reviewed and a most likely system for Hawaii described based on the "state-of-the-art" for underground transmission systems and geological considerations along the preferred route. System costs are estimated and compared with those of overhead lines.
711	Visual and Photographic Survey of a Preferred Hawaii Deep Water CAble (HDWC) Route	In Phase II-D of the HDWC Program, critical areas of the submarine path between Hawaii and Maui which were previously identified in the two bottom roughness cruises were examined in more detail using the Pisces V submersible. This report collects the data and summarizes the observations from five dives off Kohala and four dives off Maui. Bottom morphology and geology are described and related to cable path criteria. Biological observations are summarized. Appendices include: Quick Look Reports; Voice Transcripts; Video Logs; Photographic Logs: and CTD Records.
** SUBJECT AREA Environmental -		Observations, Testing and Analyses
801	Evaluation of Expected Operational Wind, Wave and Current Conditions in the Alenuihaha Channel	This report presents an evaluation of the major oceanographic and meteorological factors which would influence the conceptual design of a cable laying vessel for a commercial interisland cable system and summarizes relevant literature data. This is a guide to understanding the environmental phenomena and precedes actual wind, wave and current measurement programs in the Alenuihaha Channel.
802	Near-Shore and On-Shore Materials Characteristics	The purpose of this study was to collect and analyze samples of near-shore and on-shore soils along ten-mile sections of coastline near Kipahulu, Maui and Upolu Point, Hawaii - potential landfall areas for a commercial cable. Of prime consideration was the

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		determination of the thermal resistivity characteristics of both terrestrial and marine near-shore soils for subsequent preliminary engineering. This report includes the results of field work and soil sample analysis by laboratory testing, describes the study area's terrestrial and nearshore marine conditions and discusses results of the work. A bibliography is included, as are appendices describing field procedures and laboratory testing procedures. Fourteen tables and forty-six plates illustrate the work.
803	Deep Water Electrical Cable Corrosion Testing	Initial results from a study of the behavior of candidate deep-sea cable materials and common reference materials under Hawaii's marine conditions are presented in this report. The effort is aimed at the development of a database on the corrosion, fatigue, and abrasion of materials in Hawaiian waters. Four components of the study were initiated: a long-term comparison study of the rates of metallic corrosion in Hawaiian surface waters; a long-term study of the corrosion and macrofouling of cupronickel; a study of the crevice corrosion behavior in various high alloy stainless steels; and a study of the abrasiveness of Hawaiian rock constituents to various stainless steels. The background to each component of the work is discussed as well as the expected differences and similarities between Hawaiian and temperate zone conditions. Results, thus far, are recorded but conclusions are not drawn at this early stage in the testing process. Tables and illustrations are included.
804	Environmental Analyses	This report previews the environmental issues and permitting requirements associated with the actions proposed for both the present HDWC Program and the potential commercial program. Results of meetings with representatives of federal, state and county government agencies and telephone contacts with representatives of research facilities and other resource people are discussed, and areas of potential land and ocean use conflict are mapped. An annotated bibliography of HVDC electromagnetic field effects and selected related topics relevant to the HDWC Program and the potential commercial cable program is included.
805	Waves and Near-Surface Currents in the Alenuihaha Channel	This report contains the results of the May, 1984 to July, 1985 period of the wave and near-surface current measurement program at a location off Upolu Point, Hawaii. This report presents the acquired data in a standard format for review purposes and includes data summaries in various formats for evaluation purposes. Eight appendices make up the bulk of this report.
806	Summary of Hawaii Deep Water Cable Program	The purpose of this document is to summarize the tasks performed in the HDWC Program with a special emphasis on the at-sea test activities scheduled for 1989. This summary is useful in responding to inquiries about the program and also satisfies permit-related

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		requirements for environmental assessment of the at-sea test activities.
807	Data and Observations from Submersible Dives Along the HDWC Program Preferred Submarine Route	This data package includes a voice tape transcription; slides, video tapes, descriptive logs of the video recordings and slides, CTD data, and a quick-look report for each submersible dive. The areas offshore of Mahukona and Kawaihae, Hawaii and Kaupo, Maui were observed.
808	Environmental Review Plan	This plan compiles and updates pertinent program information and outlines the contents of an environmental assessment for a potential commercial cable system. Using information from the earlier produced Environmental Analysis, it includes identification of environmental issues and required permits for the commercial system. Alternatives to the proposed system are introduced, including "energy bridging." A preferred cable route is described in text and graphically depicted to show, generally, the path of transmission lines overland and the cable undersea from the Big Island to Oahu.
809	Bottom Roughness Survey of the Alenuihaha Channel	This report describes results of a preliminary survey of the Alenuihaha Channel characterizing the bottom roughness in terms meaningful to the deep water cable laying process. "Problem areas" are identified, needs for subsequent surveys are defined and the results of measuring bottom roughness along selected tracks are recorded. Numerous illustrations and six appendices accompany this report.
810	Plan for the Second Bottom Roughness Survey Cruise of the Alenuihaha Channel: June, 1986	This plan discusses the need for additional survey work in the Alenuihaha Channel, states the survey goals and requirements, describes the survey area, explains the participants' responsibilities, lists data to be delivered before and after the cruise, discusses the cruise schedule and clarifies the "acceptable path definition" for a cable crossing the channel.
811	Wind Characteristics and General Relationship Between Trade Wind Speeds and Wave Heights in the Alenuihaha Channel	This report collects hourly wind speed and direction data from pertinent land stations, occasional wind and wave observations from Dillingham tugs and American Hawaii Cruise ships, and hourly wind and wave data from NOAA Buoy 51005 (March 1986 only), for the period March 1984-March 1986. The data are summarized, analysed and correlated to determine the wind speed and direction characteristics in the Alenuihaha Channel and to provide a generalized relationship between wind speeds and wave heights under trade wind conditions in the Alenuihaha Channel. Attachments include four sets of raw data.
812	Cable Materials Corrosion and Abrasion Testing	This report presents data on the resistance of some typical power cable materials and common reference materials to deterioration in Hawaii's marine environment. The four tasks performed and reported on in this document are as follows: long-term corrosion tests in Hawaiian surface and deep ocean seawater, crevice corrosion testing of stainless steels in these waters, abrasion testing against slurries of Hawaiian marine

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		rock fragments, and corrosion-fatigue testing of lead in seawater and other environments. The majority of information in this report is illustrated in tables and figures.
813	Wave and Near-Surface Current Measurement Program in the Alenuihaha Channel	In order to quantify the expected wave and current conditions in the Alenuihaha Channel during cable deployment operations, field measurement programs were undertaken. This report describes the results of a 2-year wave and near-surface current measurement program spanning the period May, 1984 through May, 1986. This report presents the acquired data in standard formats for informational and review purposes. The measurement program is described, the meter mooring system is illustrated and the monitoring station location mapped. The wave and current data analyses are collected in five appendices. Detailed analyses of the data for criteria development are not included in this report.
814	Environmental Design Criteria for Cable Deployment Operations in the Alenuihaha Channel	This report resulted from a field program initiated to acquire data within the Alenuihaha Channel to enable more realistic assessments of the expected environmental conditions for design and deployment of the deep water cable. It supersedes the September, 1983 report "Evaluation of Expected Operational Wind, Wave and Current Conditions in the Alenuihaha Channel Related to the Design Criteria for the Cable Laying Vessel for the HDWC Program" which was based exclusively on data found in the literature. This report provides a reassessment of the operational wind, wave and current criteria for deployment based on the field data acquired to date. Five appendices and numerous tables and figures are included.
815	Bottom Boundary Layer Currents in the Alenuihaha Channel	This report discusses and summarizes the very near-bottom currents in the Alenuihaha Channel that would influence the installation and operation of a commercial cable system. Current observations show significant flows in the lower 10 meters of the channel. A set of velocity profiles through the Channel's bottom boundary layer was obtained in 1985 using expendable current profilers (XCPs). This report discusses the bottom boundary layer and its properties, what is known about the sea bed forms in the area of the Alenuihaha Channel and what is shown from the XCP profiles. Tabular information, numerous current velocity profiles, and a bibliography are included.
816	High Frequency Wave Analysis for the Alenuihaha Channel	The wave environment of the Alenuihaha Channel where the proposed cable system would be deployed is the subject of this report. To quantify the magnitude of wave energy in the high frequency region where the cable and vessel systems interact, a surface wave measurement field program was initiated. How the program was developed, the reduction of wave data, the fitting of theoretical spectra, spectral modality and energy, and the Alenuihaha wave data are all included. The high frequency wave study successfully

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		measured sea surface wave spectra to wave periods as short as 2 seconds. Numerous tables and figures illustrate program data and an appendix titled "Comparison of Measured High Frequency Wave Spectra With Coastal Data Information Program Spectra" is included.
817	Alenuihaha Channel Current Measurements: Final Report	This final report summarizes information collected by Horizon Marine, Inc. during three ocean current profiling surveys conducted in the Alenuihaha Channel. A total of 46 current profiles in the Channel at various tidal states were collected. This report cosists mostly of data.
818	Visual Impact Analysis of Proposed 300 KVDC Line	This report investigates the potential visual impact of the proposed 300 kVdc overhead transmission lines which would cross portions of Hawaii, Maui, and Oahu. It does so by examining the three major components which affect visibility: the observer, the object and its setting, and the interrelationships among these components. The potential corridor areas on each island are categorized into four "landscape types," based on landform and landcover characteristics. Numerous potential mitigation measures are discussed and illustrated. This study is designed to be a reference for use at all stages in the planning and development of the line. There are 29 exhibits included to illustrate the visual impact analysis.
819	Kohala Slope Near-Bottom Current Measurement Program in the Alenuihaha Channel	This report describes the results of a 17-month near-bottom current measurement program on the Kohala Slope in the Alenuihaha Channel spanning the period August, 1985 through January, 1987. Acquired data, in standard formats, as well as data summaries, are provided, and general observations made with regards to the characterization of these currents. Ten appendices make up the bulk of this report.
820	Second Bottom Roughness Survey	The purpose of the first bottom roughness survey was to characterize the bottom roughness of the Alenuihaha Channel in terms meaningful to a commercial cable laying process. The first survey isolated areas of concern in the channel which required more survey work, hence the second bottom roughness survey. Goals for the second survey were to: 1) find the "best" path possible for one cable through the areas of the Alenuihaha Channel that were determined to be most difficult; 2) collect sufficient data on the worst portion of the best cable route; and 3) find parallel paths for an additional two cables. This report describes the methodology and equipment used for the survey work and discusses data analysis, handling and storage. Actual survey operations and the results are described. Numerous charts, graphs and photos illustrate the survey results. Appendices include a summary of the first survey cruise, the plan for the second survey cruise, the shore navigation station locations and other information.
821	Hydrogen Sulfide in	The purpose of this report is to describe how hydrogen sulfide acts to increase

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	Sediments Along the Preferred Submarine Cable Route	corrosion rates, to summarize sulfide data from along the preferred cable route, and to assess the probable impact of hydrogen sulfide on a commercial cable system. An appendix titled "Descriptions of Cores Collected in Sediments Close to the Preferred Cable Route" is included.
822	Environmental Constraints to use of a Sea Electrode in a Submarine Electrical Transmission Cable System in Hawaii	This report examines the environmental consequences of and constraints to installation of a "sea return" for the Hawaii interisland electrical cable system. This report describes the options for system polarity, the selected design for Hawaii, the characteristics of sea electrodes, their environmental impacts and possible mitigation measures. A figure showing a diagrammatic section through a hypothetical shore electrode is included.
823	Analysis of Seafloor Surveys, Inc. Precision Bottom Data Between Maui and Oahu in Determination of a Potential Cable Route	This study reviews and analyzes bathymetric data collected by Seafloor Surveys, Inc. in their efforts to determine the feasibility of laying a cable from Maui to Oahu. Criteria for and identification of an acceptable path are addressed and a brief discussion of data quality and analytical methodology is appended.
824	Environmental Assessment	This assessment follows the format of an environmental impact statement and was prepared to aid the process of information transfer between the Hawaii Deep Water Cable Program and a future commercial cable project. The "action" assessed in this document is installation and operation of a high voltage (300 kV), direct current electrical transmission system capable of transmitting 500 MW of power from the geothermal resource subzones of the Kilauea East Rift Zone of Hawaii Island to Maui (50 MW) and Oahu. For environmental assessment purposes, a "preferred route" consisting of overland and submarine segments is defined. Using the interisland submarine routes and the proposed overland corridors, the assessment determines the types and severity of environmental impacts which could be expected to result from installation, operation, maintenance and repair of the cable system. Short-term and long-term impacts, as well as benefits of the system, are described. The document includes 17 figures, 12 tables and one appendix titled "Permits Summary."
825	Maui Slope Near-Bottom Current Measurement Program in the Alenuihaha Channel	This two-volume report documents the measurement program undertaken to quantify the expected range of currents in the deep, sloped regions of the channel along the cable route. These regions were recognized as presenting potential difficulties to the cable-laying operation. Current meter moorings were deployed over a period of fourteen months from October 1986 to November 1987. The results of this phase of the near-bottom

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		current measurement program are described in this report. Eight appendices are attached.
826	Abrasion-Corrosion Studies	An assessment is presented of the possibility that a submarine electrical transmission cable between Hawaii and Oahu could be damaged due to abrasion or abrasion-enhanced corrosion. Previous materials testing conducted in the HDWC Program is reviewed and results of new experiments summarized. Combining the results for the various damage mechanisms into a "worst-case" scenario for the cable indicates that electrical integrity would be maintained for a period well in excess of the 30-year system design life.
827	A Shore-based Sea Electrode System for a Submarine Electrical Transmission Cable System in Hawaii	For a commercial interisland electrical intertie, a sea electrode rather than a metallic return (additional cable) is recommended to complete the circuit. This report describes a typical sea electrode system, siting factors, requirements for substation interconnections, potential locations on Hawaii, Maui and Oahu, and estimates the cost of such a system.
** SUBJECT AREA Public Information		
901	Program Review	This early HDWC Program review was prepared to provide background information on the history and overall purposes of the Program and summarizes the work that had been performed to mid-January 1982. It is a "progress report" that was used to inform appropriate groups and agencies about HDWC Program actions.
902	Phase 1 Executive Summary	This report summarizes work performed for DPED during the first year, 1981, of the HDWC Program before federal funding was secured. The need for the program, its goals, work plan and key participants are discussed. Significant technical accomplishments described include preliminary route surveys, preliminary prototype cable design, cable vessel inventory and capability survey, and preliminary computer simulations of cable electrical and mechanical properties.
903	The Hawaii Deep Water Cable Program: Submarine Power Cable Installation in an Adverse Environment	This article, written for the American Society of Mechanical Engineers, provides a general introduction to the HDWC Program including the design of the cable, laboratory testing of the cable, the at-sea test activities, the vessel and the cable handling equipment. The benefits of the research in terms of technology transfer are also described.
904	Public Informational Program	This document contains a public informational program script prepared to describe, in general terms, the HDWC Program and the relationship of the Program to Hawaii's alternative renewable energy technologies development programs. This script is accompanied by a 35 mm slide presentation and an audio cassette with syncronized

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		narration of the script.
905	Phase II-A Executive Summary	This is the second summary of HDWC Program efforts and the first that includes work accomplished within both state-funded and federally-funded sub-programs. The interrelationship of federal and state-funded work is described, as is prior work accomplished in Phases I and I-A, federally-funded work-to-date (Phase II), and State-funded work-to-date (Phase II-A). Work planned for FY 83-84 is described by task, the program schedule is shown through 1993, program costs are described, and three potential cable route options are illustrated.
906	Progress Update - 1984	This update includes a brief description of the HDWC Program - its goals, funding sources and Program participants. It summarizes the accomplishments of 1984, a year in which the HDWC Program recorded major advances in subsystem component design and subsystem interface development, the most significant being advances in the cable subsystem.
907	Phase II-B Executive Summary	This report reviews work performed from Phases I through II-B. The major accomplishments of these cumulative efforts are identified. The review of work-to-date emphasizes the State-funded, Phase II-B tasks which included environmental analyses, electrical grid system investigations, materials corrosion and abrasion testing, at-sea route surveys, overland route analysis, and a public information program. This report also describes current efforts on federally-funded tasks including cable design and verification, cable vessel and cable handling equipment conceptual designs and at-sea route surveys.
908	Assessing and Managing Potential Health and Safety Issues Related to High Voltage Direct Current Transmission Lines	Graphics (slides and reproductions), tape recordings and a transcript make up this reference on health and safety issues related to HVDC transmission lines. Public informational briefings using these materials were given on Oahu, Maui and Hawaii in October, 1986 by Dr. Jonathan Charry of Environmental Research Information, Inc.
909	A Review of Hawaii Deep Water Cable Program and Geothermal Development in Hawaii	This review, prepared and used for HDWC Program briefings, summarizes HDWC Program accomplishments and the status of geothermal development through early 1987. Also included is a discussion of the benefits of the HDWC Program in terms of technology transfer and by-product information and technologies.
910	Phase II-C Executive Summary	The Phase II-C executive summary describes program accomplishments through August, 1987. An updated HDWC Program organizational chart and commercial cable system development planning schedule are included in this report. A "preferred route" is depicted, showing a broad corridor across the overland portions of the route and a general undersea path

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		between islands. The state-funded sub-program is discussed by research areas including environmental analyses, electrical grid system integration studies, materials corrosion and abrasion testing, oceanographic surveys, overland route surveys, and the public information program. The federally-funded sub-program is discussed by hardware subsystem including cable design and verification, cable vessel and cable handling equipment, and also the at-sea route surveys. Future activities of the HDWC Program (Phase II-D) are briefly described.
911	Public Information Program for the HDWC Program	This plan outlines the methods, contents and timing of a public information program for Phase II-C of the HDWC Program and discusses the factors that require special consideration during implemention of the plan. Eight methods of public contact are described, and a listing of public interest groups, organizations, federal, state and county agencies and major private sector entities to be contacted are listed.
912	HDWC Program Bibliography	An annotated bibliography of all reports produced under the HDWC Program, Federally-funded and State-funded, is presented. Summarized are: publication date, title, corporate author, personal author, funding source, HDWCP Call No., number of pages or sections and contents (abstract). The hardcopy report was generated from a dBASE III PLUS database file.
913	Phase II-D Executive Summary	The Phase II-D executive summary describes program accomplishments through the end of the State-funded subprogram. Phase II-D accomplishments are described by scope task; on-going federally-funded work is described by hardware subsystem. The status of activities leading to the AT-Sea Test is summarized.